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European House Price Volatility and the Macroeconomy: The Implications for European Monetary Union

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Abstract

This paper addresses the neglected question of the implications for European economic and monetary union of divergent European housing market institutions and financing. Evidence is reviewed which suggests that there is little significant convergence in European housing finance systems and their regulation. Consequently real house prices display differing degrees of volatility and cyclicality across Europe with only weak evidence that there is a common cycle across different countries. Econometric analysis finds little evidence for any substantial convergence in real house prices, with a marked difference apparent between "core" European economies such as Germany, Italy and the Netherlands and countries such as the UK and Finland where owner-occupation rates are high, housing finance systems deregulated and real house prices volatile. This difference is also found to be apparent in the degree of association between real interest rates and real house prices, with stronger causal links evident for the latter type of economy. The importance of real house price movements for the macroeconomy is to be found in their impact, working through conjectured effects on permanent income expectations, on consumer spending activity. Once again it is countries such as the UK and Finland where the causal links appear strongest. This implies that the adoption of a single European monetary policy is likely to lead to inflationary pressures in countries with higher owner-occupation rates, leading to a need for corrective fiscal action or the re-introduction of more stringent forms of personal sector financial and housing finance regulation.

Keywords: house prices, European monetary union, economic convergence

JEL Classification: E44, F42, R21

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1. Introduction

The birth of the single European currency and the process of economic and monetary convergence, which is intended to accompany both the gestation and development of this new arrival, has enormous implications for economic performance and market behaviour. However one area, relatively neglected by economists and policy makers alike, is that of the impact of European monetary integration and the introduction of a common European monetary policy on European housing markets. The process of monetary convergence is of critical importance to the behaviour of European housing markets because of the lack of uniformity and slow rate of institutional convergence of housing finance systems among the member states of the EU.

This paper investigates this issue by reviewing the extent of institutional convergence in national housing markets and by examining house price volatility across Europe and the relationship between house prices, interest rates and other indicators of economic activity. Our aims are to assess the extent of differences in house price volatility and the extent to which those differences can be explained by the responsiveness to interest rates and returns to equities, given that greater deregulation of housing finance and removal of credit rationing might lead to greater sensitivity of house prices to interest rates and to indicators of future wealth. We also aim to assess whether the linkages between consumer spending activity and the housing market are stronger where such deregulation has been more rapid. Our prior hypothesis is that the diversity of European housing finance systems, reviewed in section 2 and documented in detail elsewhere, has led to significant differences in levels of house price volatility and to stark differences in the sensitivity of house prices to changes in monetary policy. Convergence of interest rates, without any associated reform or convergence of

housing finance systems, is likely to lead to a damaging divergence in rates of real house price inflation, but a correspondingly asymmetric impact on rates of growth of consumer spending in different economies. This is because interest rate differences between countries often compensate for the effects of other variations in tax regimes in their effect on the user cost of housing. In turn, therefore, interest rate convergence may risk triggering once again the rapid growth in personal sector debt inflation which was observed in some EU economies, such as the UK and Finland, in the late 1980s and early 1990s.

The remainder of the paper is structured as follows. In section 2 we present a brief review of the diversity of institutional constraints on housing finance across the EU. Section 3 presents evidence on the degree of real house price volatility and convergence for a sample of EU economies. Section 4 presents comparative econometric evidence on the relationship between real house prices and interest rates and stock market returns in order to assess the extent to which housing market activity is more sensitive to movements in monetary policy and expected income appreciation where financial regulation has been more pronounced. The direction of the relationship between real house prices and real consumer spending activity is addressed in Section 5. Section 6 presents an overall assessment and conclusions.

2. Owner-Occupation Finance across the EU

The importance of owner-occupation as the dominant form of housing tenure in the late twentieth century is well-established across Europe. Nevertheless rates of owner-occupation vary considerably. Table 1, columns (1) and (2) reports recent estimates of the relative size of the owner-occupied and private rental sectors (with social housing the remainder). Tenure patterns vary considerably across Europe. At one extreme Germany, with

38 per cent owner-occupation, has almost equally sized owner-occupier and private rental sectors. In the Netherlands social housing is still over one third of the total, and the owner-occupied sector is also, relative to the rest of Europe, relatively small. In Austria, and in the Scandinavian countries of Sweden and Denmark households enjoy a choice between owner-occupation, or some form of co-operative ownership or private rental tenure, although the majority now opt for owner-occupation. At the other extreme Ireland, Italy, Finland and the UK have tiny private rental sectors, and for the vast majority of those in the middle and upper income ranges owner-occupation is the only tenure mode available. In Spain also the owner-occupied sector is proportionately very large, although the absence of the development of sizeable social housing sector (for cultural reasons, and because of the nature of state control prior to the establishment of democracy in 1978) is a feature here. Consequently the private rental sector in somewhat larger than in the other countries where owner-occupation is highly dominant.

Housing finance systems vary across EU member-states in many aspects and dimensions.[1] However we can highlight four main influences; the tax treatment of capital gains and of imputed rental income from the housing asset; the tax treatment of housing investments and mortgage interest payments; the extent of credit rationing on new mortgage debt; and the favourableness of the prevailing tax and subsidy regime relative to other housing tenure modes, in particular the private rental sector. Table 1 summarises the main features of these influences for twelve out of the fifteen current EU member states.

In most European economies capital gains and imputed income from owner-occupation have over the last 40 years or so been treated favourably compared to most other

[1] Maclennan *et al.* (1998) provide a fuller review and discussion.

sources of income. France is the only country to have applied capital gains tax to owner-occupied housing and then only to property over four times the average price. Only Spain and the Netherlands apply a tax on imputed rental income, but in both cases assume a very low imputed rate of return. In Spain this is offset by extremely generous tax treatment of housing investment and interest payments (see below). In some countries such as the UK and Ireland a 1% transactions duty ("Stamp Duty") is payable on house purchases, and in other EU countries VAT is payable on new houses. The latter is generally at a reduced rate (e.g. 3-6 per cent in Spain), although in the Netherlands VAT at 17.5 per cent is levied on new houses.

The tax treatment of mortgage interest is also generally favourable to owner-occupiers across Europe, although with some notable exceptions. At one extreme Germany and Austria provide no tax allowance for interest payments. Other countries place an upper limit on any tax allowance, and the case of France the allowance is only available for the first five years. In the UK the last two decades have seen a gradual erosion on the value of the allowance, by both the erosion of the real value of a nominally fixed interest on first £30,000 borrowed (currently less than half the average new mortgage advance) and the gradual reduction in the rate at which the tax relief can be claimed. The allowance is shortly to be abolished. The most favourable taxation regime on mortgage payments in is Spain, where not only interest payments can be deducted from one's tax liability at the appropriate marginal tax rate, but also up to 15 per cent of the purchase investment. It is perhaps therefore not surprising that real estate debt in Spain has risen from 15 per cent of GDP in 1983 to 25 per cent in 1994 (Alberdi and Levenfeld, 1996).

Where rationing of new mortgage credit takes place, it is usually through the form of a down-payment constraint. Often this operates on a voluntary and informal basis as a result

of lending policies operating within the housing finance sector. So for example British mortgage lenders will typically advance up to 3 or 3.25 times a single annual salary, or 2.5 times a joint annual salary on a new mortgage. In some EU countries a statutory maximum loan-to-value limit is imposed; in Germany and France this is set at 60 per cent, in Sweden and Italy at 75 per cent and in Denmark at 80 per cent. As a consequence average mortgage advances as a proportion of house values are lower. By contrast in the UK mortgage advances can easily be obtained up to 100 per cent of the current valuation, and during the late 1980s, when nominal house price inflation rates were high, advances over 100 per cent were possible for some borrowers. Financial institutions are generally able to shift the downside risk of falling collateral values onto a secondary insurance market.

In most EU economies over the last 20 years there has been a reduction in barriers to entry, and an associated increase in competition in the market for the provision of housing finance. As the Bank of England (1991) notes this is indicative of some degree of convergence. However the process of removing credit rationing has been much more rapid in countries such as the UK and Finland (in the latter case as a result of increases in average loan maturity as well as lower down-payment requirements). As Table 1 shows there remains considerable divergence in the degree of favourableness in the tax regime facing investors in owner-occupied housing.

A further important source of divergence across Europe concerns the relative availability, regulation and tax treatment of the private rental sector. Those countries where house prices have shown some of the fastest rises in the 1980s (and falls in the 1990s in the case of Finland and the UK) the private rental sector is small. This small size is arguably the result of long historical rent regulation, and relatively unfavourable tax treatment (for

landlords). On the other hand Germany, with its relatively more stable owner-occupier market and associated credit constraints, has a thriving private rental sector equal to around a third of the total market. Private sector renters are, in contrast to most other EU economies, given a much more favourable treatment by the fiscal system. Owner-occupation does not enjoy extensive taxation protection, and rent subsidies are made available to private sector tenants. Acting on the supply-side of the private sector rental market in many EU economies are systems of rent regulation, which, while they protect those on lower incomes, reduce the incentives to supply rental accommodation. It can be argued that an important effect of this is to "push" lower income and younger households into owner-occupation. Countries such as the UK have largely dismantled such controls. Others such as Spain, Sweden and the Netherlands have reduced their severity. However these changes generally have had little impact on private rental supply, in the context of simultaneous deregulation in the provision of mortgage finance.

As an overall assessment we would judge that while there are signs of some convergence in the institutional regulation of housing finance systems, particularly in the area of increased competition in the provision of finance, there is still a long way to travel before a conclusion of substantial system uniformity could be warranted.

3. House Price Convergence in EU Economies

The rather slow rate of convergence in the institutional control of national housing markets across the EU would suggest that relatively little convergence is to be observed in rates of growth of European house prices. A small number of previous studies have examined the comparative behaviour of European house prices in detail. Holmans (1994) in his detailed

survey of comparative international housing market data concludes that a number of European economies all experienced substantial common nominal growth and instability in house prices in the 1970s. Englund and Ioannides (1997) conclude, from econometric analysis, that the dynamics of house price changes are quite similar across a number of OECD countries (including US and Japan), although evidence for a common international house price cycle is rather weak.

Data correlation

Figure 1 plots the annual real rate of growth in house prices for seven EU member states for which reasonably reliable and consistent house price data can be obtained since 1970/71 or earlier.[2] A cursory inspection would support the conclusion of Englund and Ioannides – there is some suggestion of a common cycle but there is considerable variation around it. Netherlands house prices display a very pronounced cycle in the late 1970s and early 1980s. In other countries the cycle is apparent but less severe. In the late 1980s it is the UK and Scandinavia which had the common experience of large rises in house prices, following by subsequent substantial falls in the 1990s.[3] Stephens (1995) notes that the Spanish experience matches this. To a lesser extent the same pattern occurs in Ireland, although the early 1990s collapse is not as severe. In Ireland in the late 1990s a real house

[2] A wider sample of countries would be highly desirable, particularly with the inclusion of the two larger EU members, France and Spain. French data is not available on an annual basis until the 1980s (Holmans, 1994). Spanish data is virtually non-existent.

[3] The impact of financial deregulation and the severe cycle in the UK housing market in the 1980s and 1990s, along with their implications for the wider economy has been investigated quite extensively by *inter alia* Carruth and Henley (1990, 1992), Miles (1992), Bayoumi (1993), Meen (1990), Muellbauer (1992), Muellbauer and Murphy (1997). Berg and Bergstrom (1995), Berg and Lyhagen (1998) and Kort (1998) undertake detailed time-series investigations of Swedish house prices. An analysis of the Finnish case, along with an investigation of the impact of housing market liberalisation on personal sector saving, is provided by Koskela *et al.* (1992). Kennedy and Andersen (1994) provide an international comparative investigation of the impact of house prices on personal sector saving, in the context of 1980s financial deregulation.

price boom has continued to concern economists and policy makers, fuelled by falling real interest rates and high rates of economic growth.

For further investigation Table 2 summarises real house price movements across these countries by dating troughs and peaks. It is difficult from this evidence to argue in favour of a strongly coincident European house price cycle, at least before the 1980s. Greater coincidence in cycles is apparent since the mid 1980s, but the pronounced difference between, in particular, very stable real house prices in Germany and most other European countries is quite apparent from both the Table and Figure 1.

Cointegration

We now turn to a more formal econometric investigation of house price correlation and convergence within the EU. As a precursor to econometric analysis Table 3 reports Phillips-Perron unit root tests for (log) real house prices in each of our seven countries. In four of the seven cases (Finland, Netherlands, Sweden, and UK) the results unequivocably support the conclusion that real house prices are I(1). For Germany we reject the null hypothesis of non-stationarity in differences at somewhere between the 5 and 10 per cent level. For Ireland we are able to reject the null hypothesis of non-stationarity in differences at only close to the 10 per cent level. Here the explosion in house prices at the very end of our sample period, in conjunction with the rather short number of observations, makes for a series which appears close to I(2).[4] At the other extreme for Italy the test results suggest the possibility that real house prices are I(0). However the Italian series is quite "spikey" and is probably the poorest quality data of the seven series. A three year smoothed series in this case is less "erratic" and closer to being I(1).

Table 4 reports the correlation matrix for the first differenced series. The strongest correlations are for the UK with Finland and Sweden, and for Sweden with Ireland and the Netherlands. Germany stands out as having very weak house price correlation growth with the other countries, except, perhaps, Ireland.

Further analysis of correlation and convergence is provided through bivariate cointegration tests[5] for each country against the others. Cointegration can be regarded as a necessary, although not sufficient condition for convergence since it implies that the difference between two variables does not have infinite variance (Hall *et al.* 1992). Results of this exercise, using the Engle-Granger approach, are reported in Table 5. Evidence of cointegration with German house prices is found for Italy and the Netherlands (at 5% significance or better), and some evidence (between 5 and 10% significance) for Ireland. Evidence of cointegration with UK house prices is found for Finland and Italy. Further econometric evidence is reported in Table 6, which presents results of the Phillips-Hansen test for a long-run relationship between real house prices. The Phillips-Hansen procedure is used as an alternative to Johansen multivariate analysis in providing evidence of a bivariate long-run relationship. These results broadly confirm the evidence found for cointegration in Table 5. In addition the relationship between German and Irish house prices is much stronger in Table 6. There is evidence of cointegration between Netherlands and Finland, Netherlands and Ireland, and at the 10% level of significance only, Italy and Ireland.[6] Overall this provides mixed and incomplete evidence for any long-run statistical relationship between real

[4] The inclusion of a deterministic trend, while not statistically significant, raises the Phillips-Perron test statistic to –3.038, supporting the conclusion that the series is I(1).

[5] A multivariate Johansen analysis is precluded by the short duration of the time series available. This constraint also necessitates a strong *caveat* on the results reported.

house prices across the EU, although some evidence of convergence within a group of EMU economies which includes Germany, Ireland, Italy and the Netherlands. This said there is also evidence of convergence with UK house prices.

Time-varying long-run parameters

The use of time-varying parameter techniques has recently become recognised as a powerful tool for analysing long-run economic convergence. This is most easily implemented through what has become known as the Haldane-Hall methodology (Haldane and Hall, 1991). The previous discussion points to the possibility of house price convergence with Germany (reflecting perhaps convergence within an ERM/EMU group of countries, where housing finance is more heavily regulated and subject to liquidity constraints). It also suggests, to the extent that some countries have begun to deregulate housing finance provision, the possibility of convergence with the UK (where housing finance has been most subject to a deregulation process, with a resulting lowering of liquidity constraints). In the present context, therefore, we are concerned with the extent to which movements in the real house price in a particular country, relative to either that in the UK or in Germany is associated with movements in the UK real house price and with movements in the German real house price. Equations 1 and 2 summarise this:

$$(hp_D - hp_i)_t = a_{1t} + b_{1t}(hp_D - hp_{UK})_t + e_{1t} \quad (1)$$

$$(hp_{UK} - hp_i)_t = a_{2t} + b_{2t}(hp_{UK} - hp_D)_t + e_{1t} \quad (2)$$

where *hp* denotes real house price. Convergence of real house prices in country *i* with Germany implies b_1 tends to zero and b_2 to one. Convergence with the UK implies b_1 tends to one and b_2 to zero. The time-varying nature of the parameters of the process allow the

[6] Corresponding reverse regressions in each case were estimated and the results were

stochastic intercept parameters to capture any systematic influences other than those working through the German-UK house price differential, although at the expense of any possible interpretation of the direction of causality. In practice it is only necessary to investigate empirically the time-varying behaviour of the *b* parameter in one of the two equations, since the three relative real house price variables in (1) and (2) are linked through an identity.

Estimation of equation (1) is performed using the Kalman-Filter technique (Harvey 1987), with the stochastic time-varying parameters, *a* and *b*, assumed to evolve according to random walk processes. Figure 2 plots the evolution of b_1 for each of the other five countries (Finland, Netherlands, Sweden, Ireland and Italy) over the period 1972 to 1997. Ireland, Italy and the Netherlands show evidence of convergence with Germany, although for Ireland convergence is strongest in the early 1980s at the beginning of Irish membership of the exchange rate mechanism. The 1990s have seen a slight drift away. Sweden also demonstrates slight divergence from Germany, but ends the time period well away from the value of one which would imply strong convergence with the UK. Finnish house prices, on the other hand, show a progressive drift away from Germany towards convergence with the UK by 1997.

Assessment

As an overall assessment there would appear to be no strong evidence for consistent convergence of real house price movements within Europe, even within ERM and now EMU-member countries. With the exception of Finland the countries in our sample appear to have converged closer to Germany than to the UK, but only Italy appears to demonstrate a significant level of convergence. Ireland appears to have enjoyed a period of close alignment

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consistent with those reported.

with Germany, but this has broken down in the late 1990s as Irish nominal house prices have spiralled upwards. Given the variation in the institutional features of the different housing finance systems, as discussed in section 2, the lack of convergence over time is perhaps unsurprising. However this has important implications for the impact of shocks on European housing markets and the asymmetric impact that these will have on different EU member economies. We turn to this issue in the next two sections.

4. Real House Prices, Interest Rates and Wealth Effects

The issue of the possible asymmetric impact of economic shocks across Europe has two dimensions. The first is that those shocks themselves may be of different sizes in different EU member economies. It is certainly the case from the evidence reviewed in section 3 that real house prices are more volatile in some countries compared to others, and that there is no strong common cycle. The introduction of a single currency and monetary policy and possible future harmonisation of fiscal policies ought to lead to a situation in which shocks are less asymmetric in their distribution. However the second dimension is that there may be asymmetric adjustment to a given shock across countries. One of the main reasons for this is to do with the differentiation of housing finance regulation and institutions. Consequently the responsiveness of house prices to movements in economic determinants may be different.

Muellbauer and Murphy (1997) discuss deregulation in the context of a standard intertemporal model of the household's allocation of income and wealth resources to housing and consumption. They show that the removal of institutional constraints on the availability of housing finance will mean that house prices ought to become more responsive to real

interest rates and income growth expectations. In this section we investigate whether this proposition is supported by an empirical investigation of the responsiveness of real house prices to real interest rates and stock market returns across our sample of European countries. Given the requirement that under a single European currency all member states conform to a common monetary policy, the relationship between house prices and interest rates is of critical importance in understanding the consequences for the transmission mechanisms between monetary policy and the personal sector. In the UK a substantial proportion of housing mortgage repayments are adjusted along with movements in short-term interest rates, in other countries mortgage interest rates are often fixed for a long period of time or revised infrequently. In some countries, especially the UK, households can often obtain new mortgages at interest rates that are fixed for periods of between one and five years. The rates at which these are fixed often reflect movements in long-run forward interest rates. Any difference in the relationship between the effects of short and long interest rates on house prices is therefore of interest.

Ideally we might wish to construct a full-scale dynamic econometric model of the determination of house prices in each country in order to assess the impact of different candidate explanatory variables (see Hendry 1984 for the UK, Hort 1998 for Sweden). Given the lack of availability of data at a level of frequency below the annual for several of the countries in our sample, and the lack of any data prior to 1972 for several countries, this is not possible. So to determine the size and significance of any relationship Granger-causality tests were carried out between real house prices and key variables – namely interest rates and wealth expectations. As in nearly all cases the variables are non-stationary, models are estimated in first-differenced form with the inclusion of an error-correction term. This allows us to identify both long- and short-run aspects of Granger-causality (Masih and Masih 1996).

Whilst the use of an appropriate F-test for the significance of the independent variables provides evidence of short-run Granger-causality, the significance of the error correction term indicates whether there is any long-run association, as well as indicating whether the two variables are cointegrated (Bannerjee *et al.* 1993).

Phillips-Perron tests for real short-term interest rates (RS) and real long-term interest rates (RL) are reported in Table 7.[7] Tables 8 and 9 report results of the Granger-causality tests for the relationship between real house prices and the short and long rates respectively. The Phillips-Perron unit root tests reveal that the real interest rates series are I(1), except in the case of the German rates and in the case of Italian short rates which appear to be I(0). In the latter cases, whilst real house prices are in first differences, the real interest rate is in levels with the consequence that only short-run casuality is investigated. The Akaike criterion is used to determine the lag length for the Granger-causality tests – in general it supports the inclusion of only one lag. In addition each of the regressions were checked to ensure residuals are white noise, and where evidence of serial correction was found an additional lag was included. To test for Granger-causality the F-statistic is reported, given its better small sample properties. The first statistic reported refers to the case where an error correction term is included; the second refers, in the case where the error correction term is not significant, to where it is excluded. In general the two test statistics tend to support the same conclusions.

In both cases we find strong evidence for long run Granger-causality running from real interest rates to real house prices. In the German case, where no error correction term is used, we find significant short run Granger-causality from both real interest rates to real house prices. The sign of the effect is negative. As far as evidence for the reverse direction

[7] These variables are not expressed in logarithms as they may take a negative value.

from real house prices to real interest rates is concerned the results are much less conclusive. Granger-causality with short interest rates is only found for Ireland. For long interest rates we find Granger-causality in this direction for Ireland and for the UK, although in the latter case this negative association is a short-run rather than a long-run phenomenon

These results offer some support for the hypothesis that in countries such as the UK and Ireland, where home ownership and mortgage debt levels are high, their respective monetary policy has been conducted with a much closer eye on the state of the housing market. On the other hand in continental Europe, where home ownership rates tend to be lower and the availability of housing finance more tightly regulated, past activity in the housing market appears to have no effect on interest rate setting. However our results do suggest that in the long-run real house price movements are associated with past real interest rate movements throughout those European economies in our sample.

Table 10 reports Granger-causality test results for real house prices and the real stock market index (RM). The real stock market index is used as an indicator of wealth and therefore expectations about future income streams. In addition to this in more deregulated financial systems where owner-occupation rates are higher, such as in Ireland, Finland and the UK, we might expect to observe a much stronger association between housing market activity and the stock market. There are a number of reasons for this. Firstly direct and indirect household gains in the stock market might be higher through personal stock holding (as a result for example of privatisation "windfalls") or through pension fund holdings. Stock market gains may stimulate portfolio adjustment as households use those gains to finance house purchasing. Secondly in the UK housing finance products were until the 1990s increasingly stock market linked through the sale of "endowment" mortgages where

repayment of the mortgage principal is through a fund whose performance is linked to stock market performance.

The results reported to some extent bear these predictions out. The table provides evidence of Granger-causality from house prices to stock market returns Ireland, Sweden and the UK, as well as for Germany. The association is strongest in the UK and Germany where stock markets are largest and most developed. The sign of the association is negative consistent with portfolio adjustment effects. For Finland we find significant evidence for Granger-causality running from real house prices to stock market returns, with a positive association between the two. This is consistent with a feedback association between the housing market and financial assets perhaps working through the impact of housing buoyancy on the construction and consumer durables' sectors. The linkage between consumer spending (or its converse personal sector saving) and the housing market has been discussed elsewhere particularly in the UK context.[8] We turn to a further examination of this issue on the next section.

5. Real House Prices and Consumer Spending Activity

The relationship between housing wealth and household consumer expenditure has subject to considerable discussion in those countries, such as the UK, where housing market boom-bust cycles have fed into firstly rapid increases in consumer spending and subsequently saving in order to reduce a later "debt overhang" problem. The key institutional linkage is generally regarded as financial liberalisation, which has increased the "fungibility" of

[8] Carruth and Henley (1992) report evidence in the UK context for a strong relationship between the housing market and consumer durables spending. See other references in footnote 2.

housing wealth. Increased ability to borrow for house purchase and remortgage to release subsequent housing equity gains has increased the sensitivity of consumer spending and saving to house price movements. Within the context of ideas concerning life-cycle consumption behaviour financial liberalisation may have profound implications for the timing of consumption and saving. This is also true to the extent that some households may (possibly mistakenly) regard appreciation of house values as reflecting permanent wealth increases offering a permanent increase in consumption opportunities (Attansio and Weber 1994). Kennedy and Andersen (1994) in an earlier study find considerable diversity across European countries in the effects of housing wealth on savings behaviour spanning both a positive and a negative relationship. Carruth *et al*. (1999) could find no evidence for a common consumption function across 15 EU countries (although data limitations prevented them from directly including controls for housing and other forms of personal wealth).

Here we repeat the approach of the previous section by looking for Granger-causality effects between real house prices and real consumer spending. Table 11 reports Phillips-Perron unit root tests to establish the order of integration of real consumer spending. For the sample period in question the test results establish that spending is I(1) in all cases except the Netherlands and Italy where it appears to be I(0). In the latter cases, therefore, we investigate the relationship between the growth in real house prices and the level of real consumer spending. Table 12 reports the Granger-causality test results, along with error correction coefficients. We find significant evidence of long-run bi-Granger-causality for the two countries with the strongest cycle in real house prices in the 1980s, namely Finland and the UK. In addition to this the table shows evidence of short-run Granger-causality from real consumer spending to real house prices for Ireland. Thus where owner-occupation rates are

highest and real house prices most cyclically volatile we find the stronger evidence of an association between total personal sector spending activity and the housing market.

6. Assessment and Conclusions

Across the European Union there exists a substantial diversity in the degree and extent to which national governments intervene in the housing market. There are differences in the tax treatment of mortgage interest payments and in housing capital gains, differences to which housing finance regulation imposes credit and down-payment constraints on home-buyers, differences in the degree of competition in the provision of mortgage products and differences in the way in which other forms of housing tenure are favoured/disadvantaged relative to owner-occupation. We find little evidence to suggest any process of strong convergence in housing finance institutional arrangements. On the contrary, to the extent that countries such as the UK have engaged on a process of deregulation over the last twenty years while others, most notably Germany, have undertaken no such process, available evidence suggests divergence rather than convergence. Consequently substantial differences in the structure of housing tenure (between owner-occupation, private forms of tenure and state provision of social housing) exist and persist. It is perhaps rather surprising therefore that there has been little or no discussion at either the levels of economic analysis or of policy-making of the implications of this state of affairs for the process of monetary integration. Furthermore we are aware of no international comparative attempts at any form of cost-benefit analysis of the different forms of housing finance/housing provision regulation.

Although there is some evidence for a common house price cycle across the countries we examine, it is rather weak. Given the discussion above concerning the institutional and regulatory background, we should not be surprised by this. There are considerable differences in the amplitude of the cycle across countries, ranging from Finland, UK and Italy where the cycle is very strong to Germany where the degree of cyclicality is very much less. At the time of writing both Finland and Ireland are experiencing very rapid real house price growth particularly around their capital cities, and there is growing evidence of rapid real house price growth re-emerging in the South East of the UK.

Formal econometric evidence for correlation and convergence supports these conclusions. Cointegration analysis suggests some support for real house price convergence within some of those countries now in the EMU (Germany, Ireland, Italy and the Netherlands). Time-varying parameter (Kalman Filter) analysis suggests the same convergence "club", although with Ireland starting to drift away very recently. This analysis suggests that real house prices in Finland and the UK are closer to each other than to the rest of Europe – consistent with their shared experience of a recent boom-bust housing market cycle.

In all the countries we examine we find evidence of a long-run relationship between real interest rates and real house prices with long-run Granger-causality running from interest rates to house prices. Movements in monetary policy feed through to real house prices, if not in the short-run then certainly in the long-run. However only in the cases of the UK and Ireland do we find evidence that the past real house price growth influences the monetary policy "reaction function". This suggests that, in the UK context of high level of owner-occupation and deregulated provision of housing finance, monetary policy is sensitive to the

state of the housing market. At the time of writing this is apparent in the Bank of England's Monetary Policy Committee recent decision to raise short-term interest rates, widening the gap between UK and Euro-zone nominal rates despite low UK consumer price inflation, because of concerns about accelerating house prices.

Volatile housing markets and house prices would not necessarily in themselves be a cause for concern about economic performance, unless there is evidence of transmission mechanisms between the housing market and the wider economy. At a less direct level, but beyond the scope of the present paper, might be supply-side concerns about the impact of house price volatility and intra-European divergence of house prices on labour mobility. Inter-regional mobility rates are very low in Europe compared to within the United States. If labour mobility is perceived as a potentially important mechanism for smoothing unemployment disparities across Europe then real house price divergence (as well as high housing market transactions costs) may hinder the operation of that mechanism. A more direct connection between the housing market and macro-economic activity is likely to arise through the potential effects of real appreciation of housing assets on perceived levels of permanent income and thus on consumer spending. This is an issue which has already generated a fair volume of research in the UK context, but rather less elsewhere in Europe. The results in this paper offer some explanation for this – only in the UK and Finland do we find significant Granger-causal links from real house prices to real consumer spending. It is perhaps not surprising that these two economies are amongst those with the most volatile housing markets in Europe.

What are the implications for economic and monetary union in Europe? Our findings would suggest that those smaller European economies, such as Ireland or Finland, where

owner-occupation rates are high and housing finance systems largely deregulated are likely to experience considerable further house price volatility under a current regime of low real and nominal interest rates. This will present problems for macroeconomic management to the extent that rapid appreciation of housing assets fuels shifting perceptions about permanent income, leading to pressure for either increased regulation and control over housing finance or (politically problematic) fiscal measures to dampen domestic consumer demand. For the UK which is not yet a member of the single European currency, future membership is likely to lead to similar difficulties. At present the monetary authorities of the Bank of England can and do exercise the option to use monetary to anticipate potential house price volatility. This is largely as a result of an acknowledgement, based on the experience of the second half of the 1980s and early 1990s, that an asset bubble in the housing market can, if unchecked by other policy correctives, lead to significant inflationary pressure. The UK will be a larger player within EMU than an Ireland or a Finland, and housing market fuelled inflationary pressure within the UK economy and its potential spillovers elsewhere in the Euro-zone may figure rather more significantly in the European Central Bank welfare function. However future membership of EMU will inevitably restrict the room for policy manoeuvre leading to pressure to re-establish mechanisms for more effective regulation in the provision of housing finance. A process of institutional convergence will inevitably be set in train. How long that process will take is a matter of considerable speculation.

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Appendix: Data Definitions and Sources

House prices

Italy: National average prices of new and renovated houses in large and mid-size cities, source: Centro Studi Investimenti Sociali (CENSIS), Annual Reports.

Germany: Average market price of detached and terraced houses sold with vacant possession, source: Ring Deutscher Makler (German Real Estate Brokers Association). (See Holmans (1994) for further details).

Netherlands: (up to 1977) Offical average house price index, source: Maandstatistiek Bouwnijverheld, June 1986. (1978-) average house prices, source: Onderzoek Prijsontwikkling Particuliere Woningen, Netherland Central Bureau of Statistics. (See Holmans (1994) for further details).

UK: Average price of new dwellings on which mortgages have been approved, source: Office for National Statistics, Economic Trends Annual Supplement.

Finland: Average price for apartments and terraced homes, as recorded by the Real Estate Agents Association and the Bank of Finland.

Sweden: Index based on owner occupied one and two-dwelling buildings, based on reports of title registrations.

Ireland: Average price of new and second hand homes, source: Irish Central Statistical Office.

Consumer Spending

Real consumer spending, source: OECD Main Economic Indicators, except Finland, Ireland and Sweden, source: IMF International Financial Statistics, all via Datastream.

Output

Real GDP, source: OECD Main Economic Indicators, except Finland, source: National Accounts, and Ireland and Sweden, source IMF International Financial Statistics, all via Datastream

Stock Prices

Main national stock market return index, including both capital gains and dividends, source Datastream.

Real Interest Rates (Short)

Defined as $r_t - (p_{t+1} - p_t)/p_t$ where r is the short term nominal interest rate and p the consumer price index. Short interest rate: 3 month treasury bill rate except Finland, official discount rate; source OECD Main Economic Indicators, via Datastream.

Real Interest Rates (Long)

Defined as $r_t - (p_{t+1} - p_t)/p_t$ where r is the long term nominal interest rate and p the consumer price index. Long interest rate: Return on long-term government bonds; source Datastream.

Consumer price index, source OECD Main Economic Indicators, via Datastream.

Table 1: Housing Finance Systems across the EU

Country	(1) Owner-Occupation Rate[1]	(2) Private Rental Occupation Rate	(3) Tax Deductability of Mortgage Payments	(4) Tax Treatment of Capital Gains and Imputed Rental Income	(5) Loan to Value Ratios (per cent)[3]	(6) Typical home loan maturity	(7) State Intervention in Private Rental Sector
Austria	41/55	22	none	CGT exempt over 10 years	80	12 years[5]	Rent regulation
Belgium	62	30	TA (DC)	CGT exempt, IRIT with 12.5% credit	80	15-20 years	Rent regulation
Denmark	50/58	24	TA	CGT exempt	65 (80)	30 years	Rent regulation
Finland	72/75	11	TA (C)	CGT exempt over 2 years	80	15 years	Subsidised loans; CGT exempt
France	54/62	21	TA for 5 years	CGT exempt but wealth tax over FF4.16m	60 (60)	15 years	Largely unregulated
Germany	38	36	None	CGT exempt	50 (60)	12 years[5]	Rent and loan subsidies
Ireland	80	9	TA (C)	CGT exempt	65		Landlord tax relief
Italy	67/86	8	TA (C)	CGT exempt over 5 years	50[4] (75)	10-25 years	Part regulated
Netherlands	47	17	TA	1.8% IRIT; CGT exempt		30 years	Rent regulation[6]; GCT exempt
Spain	76	16	TA on interest and principal	CGT exempt if reinvested and 2% IRIT	80	15 years	Rent regulation[6]; Subsidised loans
Sweden	43/62	16	TA	CGT exempt but wealth tax over SK800k	50 (75)	20-30 years	Rent regulation[6]; Subsidised loans
UK	66	10	TA (C)	CGT exempt	75	25 years	Limited landlord tax incentives

Key: TA – tax allowance; (C) – up to ceiling; (DC) – up to ceiling which declines over mortgage term;
GCT – capital gains taxation; IRIT – imputed rental income taxation

Notes: 1. higher number includes co-ownership and cooperative ownership; 2. West Germany; 3. Average advances; statutory maximum in brackets; 4. with mortgage queuing; 5. Typical *Bausparkassen* advance, longer terms possible from mortgage bond funds; 6. Recent relaxation in the severity of regulation

Sources: (1), (2) Balchin (1996), data refer to 1995
(3) Kennedy and Andersen (1994), data refer to 1992, supplemented by information from Balchin (1996)
(4) Price Waterhouse Coopers (1996)
(5) and (6) Kennedy and Andersen (1994); data refer to 1992 supplemented by information from Bank of England (1991); Balchin (1996); and Freeman (1997).

Table 2: Real House Price Cycles in EU Economies

Year	Germany	Netherlands	Italy	Sweden	Finland	UK	Ireland
1973			T (-8% p.a.)		P (+13% p.a.)	P (+22% p.a.)	T (-2% p.a.)
1974							
1975	T (-5% p.a.)		P (+30% p.a.)	P (+10 % p.a.)	T (-11% p.a.)	T (-14% p.a.)	
1976			T (-8% p.a.)				
1977		P (+22% p.a.)					
1978							P (+18% p.a.)
1979	P (+9% p.a.)					P (+12% p.a.)	
1980				T (-13% p.a.)			
1981		T (-21% p.a.)	P (+18% p.a.)			T (-8% p.a.)	
1982			T (-15% p.a.)				T (-9% p.a.)
1983					P (+10% p.a.)		
1984							
1985	T (-7% p.a.)				T (-1% p.a.)		
1986							
1987							
1988				P (+12% p.a.)	P (+27% p.a.)	P (+19% p.a.)	
1989			P (+20% p.a.)				
1990							P (+9% p.a.)
1991						T (-8% p.a.)	T (-1% p.a.)
1992		P (+10% p.a.)		T (-22% p.a.)	T (-22% p.a.)		
1993			T (-17% p.a.)				
1994	P (+6% p.a.)						

Notes: P = peak; T = trough

Table 3: Phillips-Perron Unit Root Tests for Real House Prices

Country	log HP	Δ log HP
Finland	-1.897	-5.408
Germany	-1.887	-2.784
Ireland	-0.079	-2.625
Italy	-2.996	-4.279
Italy**	-2.789	-3.829
Netherlands	-1.238	-3.401
Sweden	-1.867	-3.062
UK	-1.983	-3.787

Notes: Critical values –3.00 (5%), -2.63 (10%).
Test statistics calculated in each case using 5 Newey-West lags and Bartlett weights.
Sample period: 1970-1997, except Germany 1972-1997
** denotes smoothed series using 3 year moving average.

Table 4: Correlation Matrix for Δ log HP

Country	Fn	Ge	Ir	It	Ne	Sw	UK
Finland	1.000	-0.152	0.040	-0.072	-0.229	0.185	0.596
Germany		1.000	0.298	0.134	0.040	0.040	0.202
Ireland			1.000	0.163	0.445	0.515	0.162
Italy				1.000	-0.220	0.210	-0.290
Nether.					1.000	0.558	0.091
Sweden						1.000	0.336
UK							1.000

Sample period: 1972-97

Table 5: Engle-Granger Tests for Bivariate Cointegration

Country	UK	Finland	Ireland	Italy	Netherlands	Sweden
Germany	-2.610	-2.753	-3.464	-3.980	-4.087	-2.945
UK		-3.746	-2.280	-4.128	-3.041	-2.880
Finland			-2.963	-3.245	-2.970	-3.516
Ireland				-1.536	-2.431	-1.353
Italy					-3.746	-3.733
Netherlands						-2.652

Notes: Critical values -3.60 (5%), -3.24 (10%)
The order of the autoregressive process was chosen by reference to the Akaike Information criterion – in most cases it is one.
Sample period: 1970-1997, except tests with Germany 1972-1997

Table 6: Phillips-Hansen Estimates of Bivariate Cointegrating Relationships

	Coefficient					
Dep. Variable: log HP	α	β_{UK}	α	$\beta_{Germany}$	α	$\beta_{Finland}$
Germany	-0.646 (0.758)	0.233 (1.739)				
Finland	-1.883 (1.757)	0.430 (2.547)	1.130 (2.188)	-0.313 (0.501)		
Ireland	4.457 (4.254)	0.277 (1.677)	5.247 (54.796)	1.157 (10.009)	6.262 (35.488)	-0.075 (0.378)
Italy	0.800 (0.859)	0.254 (1.767)	1.831 (8.210)	0.713 (2.647)	2.345 (14.463)	0.110 (0.603)
Nether.	5.179 (4.227)	-0.041 (0.212)	4.332 (11.612)	0.641 (1.421)	5.322 (37.804)	-0.499 (3.160)
Sweden	5.421 (5.924)	-0.085 (0.588)	4.770 (18.506)	0.064 (0.204)	5.016 (46.930)	-0.175 (1.464)

	Coefficient					
Dep. Variable: log HP	α	$\beta_{Ireland}$	α	β_{Italy}	α	$\beta_{Netherlands}$
Italy	-0.327 (0.221)	0.445 (1.858)				
Netherlands	0.878 (0.453)	0.643 (2.053)	4.993 (5.880)	-0.045 (0.129)		
Sweden	4.346 (2.647)	0.078 (0.295)	4.563 (7.695)	0.118 (0.483)	2.691 (5.288)	0.441 (4.234)

Notes: T-statistics in parentheses
Estimations in all cases use 5 Newey-West lags and Bartlett weights.
Sample period: 1970-1997, except tests with Germany 1972-1997

Table 7: Phillips-Perron Unit Root Tests for Real Interest Rates and Stock Market Return

Country	RS	Δ RS	RL	Δ RL	log RM	Δ log RM
Germany	-3.525		-4.340		0.471	-6.056
Finland	-1.983	-6.229	n.a.	n.a.	-0.327	-6.440
Ireland	-2.017	-6.935	-2.221	-6.058	0.800	-11.715
Italy	-3.318		-2.200	-7.079	-0.949	-5.957
Netherlands	-1.378	-7.520	-1.449	-6.029	2.076	-5.279
Sweden	-2.795	-12.380	-2.380	-14.783	0.421	-6.430
UK	-2.029	-12.527	-2.354	-8.375	1.243	-5.611

Notes: Critical values –3.00 (5%), -2.63 (10%).
Test statistics calculated in each case using 5 Newey-West lags and Bartlett weights.
Sample period: 1970-1997, except Germany 1972-1997

Table 8: Granger Causality Tests for Real House Prices and Real Short Interest Rates

Country	log HP ⇒ RS			RS ⇒ log HP	
	F-stat (1)	ect (t-stat)	F-stat (2)	F-stat (1)	ect (t-stat)
Germany	0.505 (+)			9.155** (-)	
Finland	0.512 (+)	-0.036 (1.345)	1.715	1.927 (-)	-0.327** (4.889)
Ireland	1.752 (-)	-0.107* (1.756)		0.004 (+)	-0.224** (2.778)
Italy	0.140 (+)			1.759 (-)	
Netherlands	0.053 (+)	-0.019 (0.862)	0.616	0.232 (+)	-0.208** (3.065)
Sweden	1.869 (-)	-0.018 (0.393)	2.196	2.431 (+)	-0.197** (4.268)
UK	1.499 (-)	-0.017 (0.470)	1.515	0.809 (-)	-0.160** (2.429)

Notes: ect = error correction term coefficient, $(\log(HP)\text{-}RS)_{t-1}$, with associated t-statistic in parentheses. F-stat (1) is the Granger causality test with the inclusion of the error correction term; F-stat (2) is that with it omitted.
** and * denote significance at 5% and 10% respectively.
(+) and (-) indicate the sign of the (summed) coefficients on the explanatory variable lags.
Sample period: 1970-1997, except Germany 1972-1997

The Ireland test includes the dummy, taking the value 0 until 1994 and 1 thereafter. A dummy variable was included in the Sweden, Finland and UK regressions, where causality runs from both short and long-term interest rates to house prices. The dummies are for 1988 (Finland), 1975 (Sweden) and 1974 (UK), coinciding with excess volatility in the housing market.

Table 9: Granger Causality Tests for Real House Prices and Real Long Interest Rates

Country	log HP ⇒ RL			RL ⇒ log HP	
	F-stat (1)	ect (t-stat)	F-stat (2)	F-stat (1)	ect (t-stat)
Germany	0.292 (+)			4.520** (-)	
Ireland	3.767* (-)	-0.098* (1.922)		0.750 (+)	-0.232** (3.116)
Italy	0.116 (+)	-0.072 (1.343)	0.599	0.150 (-)	-0.323** (2.096)
Netherlands	1.361 (-)	-0.171 (1.138)	0.769	3.136* (+)	-0.224** (3.675)
Sweden	2.641 (-)	-0.049 (1.257)	1.865	4.504** (+)	-0.190** (4.370)
UK	4.406** (-)	-0.034 (1.034)	4.438**	0.314 (+)	-0.121* (1.722)

Notes: see Table 8.
ect = $(\log(HP)\text{-}RL)_{t-1}$
No consistently defined long-run rate of interest is available for Finland over the sample period.
Sample period: 1970-1997, except Germany 1972-1997

Table 10: Granger Causality Tests for Real House Prices and Real Stock Market Indices

Country	log HP ⇒ log RM			log RM ⇒ log HP		
	F-stat (1)	ect (t-stat)	F-stat (2)	F-stat (1)	ect (t-stat)	F-stat (2)
Germany	7.952** (-)	0.011 (0.192)	8.467**	0.047 (+)	-0.021 (1.211)	0.498
Finland	1.079 (-)	0.018 (0.177)	1.624	9.127** (+)	0.009 (0.457)	9.526**
Ireland	2.927* (-)	0.030 (0.338)	2.959*	1.295 (+)	-0.006 (0.279)	1.847
Italy	2.054 (-)	-0.097 (1.019)	1.568	0.008 (+)	-0.033 (0.795)	0.102
Netherlands	1.314 (-)	0.053 (1.344)	0.794	1.691 (-)	-0.025 (1.569)	0.785
Sweden	4.117* (-)	0.084 (1.255)	3.394*	0.361 (+)	-0.017 (1.121)	0.519
UK	8.676** (-)	0.058 (0.975)	8.292**	1.604 (+)	0.007 (0.237)	2.045

Notes: see Table 8.
ect = $(\log(HP)-\log(RM))_{t-1}$
Sample period: 1970-1997, except Germany 1972-1997

Table 11: Phillips-Perron Unit Root Tests for Real Consumer Spending

Country	log C	Δ log C
Germany	-0.168	-3.137
Finland	-1.697	-5.673
Ireland	0.075	-7.213
Italy	-3.861	
Netherlands	-7.385	
Sweden	-1.583	-7.281
UK	-0.002	-5.311

Notes: Critical values –3.00 (5%), -2.63 (10%).
Test statistics calculated in each case using 5 Newey-West lags and Bartlett weights.
Sample period: 1970-1997, except Germany 1972-1997

Table 12: Granger Causality Tests for Real House Prices and Real Consumer Spending

Country	log HP ⇒ log C			log C ⇒ log HP		
	F-stat (1)	ect (t-stat)	F-stat (2)	F-stat (1)	ect (t-stat)	F-stat (2)
Germany	1.930 (-)	0.008 (0.416)	1.975	0.402 (+)	-0.086 (1.645)	1.642
Finland	0.166 (+)	0.053** (2.605)		8.962** (+)	-0.329** (4.271)	
Ireland	0.210 (+)	0.049 (0.210)	0.107	3.196* (+)	-0.057 (0.933)	4.249*
Italy	0.728 (-)			0.175 (-)		
Netherlands	0.593 (+)			1.334 (-)		
Sweden	0.068 (-)	0.003 (0.126)	0.073	1.330 (+)	-0.077 (1.561)	1.377
UK	0.494 (+)	0.188** (4.062)		0.076 (+)	-0.640** (3.976)	

Notes: see Table 8.
The German test includes a intercept dummy variable for German re-unification in 1991.
Sample period: 1970-1997, except Germany 1972-1997

Figure 1: Real House Price Growth 1973 to 1997

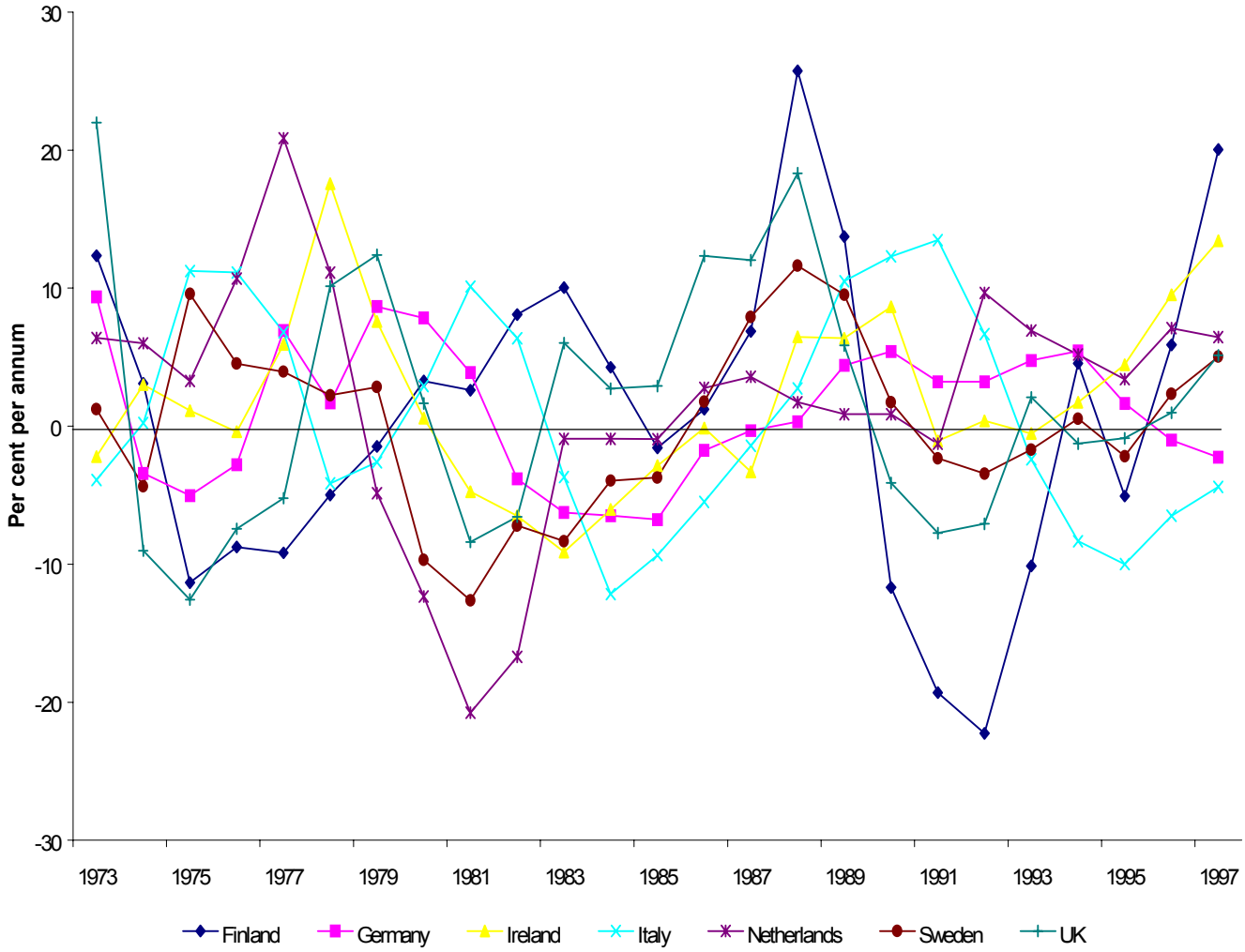
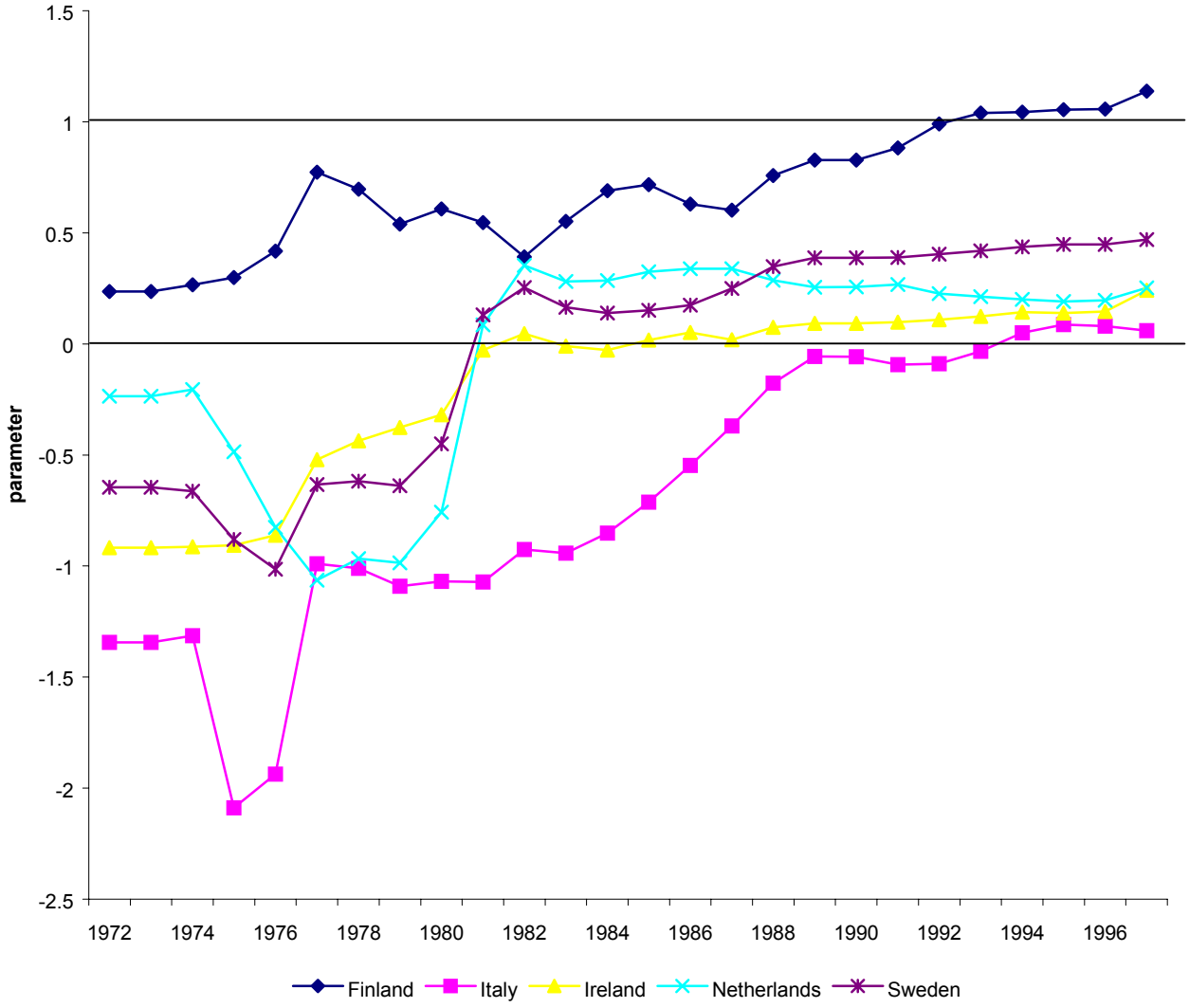


Figure 2: Kalman Filter Convergence Estimates



Note: estimation sample period 1972-1997